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EXECUTIVE AND PERSONNEL
MANAGEMENT
ON THE
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A MEDIUM FOR THE EXCHANGE OF IDEAS AND
EXPERIENCES BY OPERATING EXECUTIVES
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JOB ANALYSIS AS IT RELATES TO PERSONNEL TRAINING

by

ALLEN H. HODGSON. (R-6)

Due to the multitude and great variety of activities involved in Forest Service work, no forest officer can do his work effectively without continuous study and training and no regular employee of the administrative branch of the Service can escape being a trainer of men. The work of every inspector, supervisor and ranger, either by intention or otherwise, consists largely of personnel training. It is unavoidable.

The efficiency of a forest officer as an instructor is measured, not by his knowledge of administrative and protection activities alone, but by his ability to impart this knowledge to others. He can not do this effectively, unless he is skilled in the use of those special "tools" which have been tried out and adopted by men who have made training a profession. Few of us have stopped to consider that personnel training is an activity in itself—a separate job, requiring special "tools" or devices.

In the Forest Service we are beginning to take pride in the fact that our personnel training work is tied into the job. In other words, it is not our purpose to furnish background instruction but to confine our efforts to the every-day activities and to assist the trainee to do these every-day jobs more efficiently. Assuming this to be our main objective in personnel training, we are at once confronted with the question: What are we going to teach? in order to accomplish this aim with the least amount of time and effort. The answer to this question may be found in the device which is known as "job analysis". By job analysis we mean the breaking of a more or less complicated job down into its simple elements.

For example, did you ever stop to consider what the average man does when you ask him the time? Probably not unless you have been thinking in terms of job analysis.

This is what he does:

1. Puts thumb and forefinger of the right hand into watch pocket.
2. Grasps watch.
3. Takes watch out of pocket and holds it flat in the hand with the face up.
4. Looks at face of watch and tells the time.
5. Slips the watch back into pocket.
6. Removes hand.

Try it and see if the job of telling the time does not naturally break down into these six distinct *doing* or mechanical operations. (The *knowing* or mathematical part of reading the time is something else and would become a part of the technical knowledge necessary in teaching this job.)

Did you try it? If so, you have analyzed a job.

"Believe it or not" job analysis is as simple as that and regardless of what any one may say regarding the subject, do not allow yourself to think otherwise.

As a matter of fact, job analysis is such a simple tool, or device,

that we are very liable to overlook its value, not only in personnel training, but in other common activities of our work.

Now, with the hope of clearly illustrating two or three pertinent points which have a bearing on job analysis, I am going to introduce an example and ask you to do some things that are so simple as to present some more or less ludicrous aspects. Please contribute your patience and do not feel that your intelligence is being imposed upon.

First take your pencil and paper and *from memory* write down in 1, 2, 3 order and step by step, exactly what you do when you decide to put on your overcoat. I assume that you have been doing this job for a great many years and therefore you should experience no difficulty in complying with this request. If, by chance, you live in Los Angeles you may select some other job more common to your experience.

After you have analyzed the job of putting on your overcoat from memory, go to where it is hanging, (assume that it has been placed on a clothes hanger which is suspended from a hook and that the back of the overcoat is facing you), and very slowly put it on in the usual manner. As you do this, take note of each step or operation through which you progress in accomplishing the job. Then compare these results with the analysis made from memory. You may be one of those individuals with an exceptional memory and will score 100 per cent, but if I am not mistaken, you will be surprised to note the many ways in which your memory failed you in making your first analysis of this very common job.

There are, no doubt, almost as many ways of putting on an overcoat as there are individuals, each way depending on personal habits. Most people, who have given the subject thought concede that there is usually "*one best way*" of accomplishing a *doing* job. It would seem, therefore, that if a great deal depended on the speed and efficiency of putting on an overcoat we would want to ferret out this "one best way" and encourage everyone, within certain limits, to adopt it.

Your way of putting on an overcoat may be better than my way, but for the purpose of carrying out my illustration, as well as for giving you some basis for comparison, I will present an analysis of the job as I do it.

1. With left hand grasp clothes hanger and the upper lefthand side of the overcoat collar.

2. With left hand remove both hanger and coat from the closet hook, with the back of overcoat facing the operator.

3. With right hand reach around right side of coat and grasp clothes hanger.

4. Left hand releases hanger but with the four fingers under yoke of collar, continues to support overcoat.

5. Right hand removes clothes hanger and returns it to closet hook.

6. Suspended on the four fingers of left hand, the overcoat is revolved until its front faces the operator.

7. The right forearm, with an upward motion, is moved across right

hip which pulls the sleeve of the ordinary coat down so that its lower edge can be caught and held by the right hand.

8. With the last three fingers of the right hand folded up, the lower edge of the sleeve is caught and held. The thumb remains straight but the forefinger is bent around the end of thumb.

9. The collar of the overcoat is now raised by the left hand to the level of the right shoulder and at the same time the overcoat is drawn toward the operator.

10. The right hand, with the thumb and crooked forefinger pointing out and the last three fingers holding the sleeve of the ordinary coat, is thrust outward and into the right sleevehole of the overcoat.

11. As the right hand and arm are thrust into the overcoat sleeve, the left hand, supporting the collar of the overcoat, is brought up to the right side of the operator's neck.

12. The left hand releases the overcoat and the latter settles down and hangs on the operator's right shoulder.

13. The left hand is dropped to the operator's left side so that the forearm lies across the left hip.

14. With an upward movement of the left forearm, the lower edge of the ordinary coat is pulled down. This is caught and held by the last three fingers of the left hand. The thumb of left hand sticks out and the forefinger is bent around its end.

15. The left arm is now twisted under with the left hand pushed around to the rear of the left hip.

16. The forefinger and thumb of left hand feel around until they find the opening of the overcoat's left sleeve.

17. By a forward, spreading, motion, the left hand and arm are forced into and through the left sleeve of the overcoat.

18. Both hands now release the sleeves of the ordinary coat and the arms are given a quick shove forward and outward, thus settling the overcoat around the operator's shoulders.

19. The right hand reaches upward to the back of the operator's neck, grasps collar of overcoat and pulls up.

20. The left hand reaches backward, catches tail of the ordinary coat and pulls down. (19 and 20 are done simultaneously).

21. Both arms are returned to the side of the operator and the shoulders are hunched forward and then backward to settle overcoat into place.

22. Both hands grasp front edges of the overcoat near the bottom of the lapel and smooth the front of the coat into place.

23. The left hand takes hold of top buttonhole and buttons and fastens overcoat at this point.

24. Both arms are returned to the operator's sides and the job is completed.

Whoever would have guessed that there could be twenty-four distinct operations included by the job of putting on an overcoat?

I have introduced this analysis for the following purposes:

1. To show that many of the jobs which enter into our every day life and which we do, by force of habit, almost unconsciously are really made up of many complex actions or operations.

2. To indicate that you and I can accomplish the same job but our technique, or way of doing the various separate operations, may be different and to raise in your mind this question: Of the two, which is the best way?

The old saying reminds us that "there is more than one way of skinning a cat" but I am inclined to believe that if this cat-skinning job were analyzed on a speed and efficiency basis that there would prove to be but *one best way*.

3. To prove that you can not always depend on your memory in making a job analysis of even the most common and apparently simple job.

It is necessary to go through and study each operation *on the job* before you can make a satisfactory analysis. I believe that if you followed my suggestions regarding the memory and the actual analysis of the overcoat job, you will see this.

4. To indicate the many difficulties with which a *new* learner is likely to be confronted when you are endeavoring to teach him to do efficiently some job with which he is totally unfamiliar but which to you is as plain as a, b, c.

The overcoat job appeared so simple to you as to be almost ludicrous but I imagine that if you endeavored to teach this job to a southsea-islander, who had never worn clothes, you would be met with many difficulties.

It is only a short step from the job analysis of "telling time" or "putting on an overcoat" to that of "making a standard splice in a No. 9 telephone wire", "putting out a class A fire", "the construction of a standard steel lookout tower", or "organizing a crew of 500 men to fight a 1,000 acre fire".

Let us turn now to the practical phase of job analysis as it relates to personnel training. Assume, for example, that you, an experienced packer, were faced with the task of teaching a new man who had never been around a horse before, how to throw a diamond hitch. (And this, by the way, is one of the hardest things to teach unless the job is analyzed.) What would you do? Where would you begin? If you are like most packers you would, with a flourish of rope, quickly throw the hitch by laying the diamond loosely on top of the pack. You would then explain the various loops and twists and wind up by tightening the hitch. Then, when the trainee tried his hand at it and failed, you would ridicule him for being dumb. In this case, it would not be the trainee who failed, but you yourself because with your ability to throw the diamond almost automatically, you, like the fellow and his overcoat, had unconsciously done some things which are very important adjuncts in doing the job correctly. They come to you so automatically that you overlooked their importance and you, therefore neglected

to call attention to them.

Now, instead of using the above method, suppose that you first analyzed the job and broke it down into operations in 1, 2, 3 order. You would then be able to explain each operation as you came to it, going over each one in its turn until the trainee got and remembered the action and idea. Thus:

1. Stand on left side of horse.
2. Pick up lash rope in both hands with the belly-band just beyond the right hand.
3. Throw the belly-band across the middle and over the pack.
4. Reach under horse and grab the hook end of belly-band with left hand.
5. Grab rope with right hand and pass it through the belly-band hook. (See that open side of the hook faces rear of horse.)
6. With left hand pull up on rope thus tightening the belly-band into place.
7. Etc., Etc. (I will not attempt to depend on my memory any further, because, as pointed out in the overcoat example, that might prove disastrous.)

The point I wish to make is that by this method you are giving your trainee in sequence a logical exposition of just what is done and when an operation, which gives him trouble, is encountered you can stop and go over that part of the job until he understands it.

By job analysis we are able to find out just what a man who is the most proficient of a group, does to accomplish the greater, or more efficient results and when once learned, this knowledge or ability can be transmitted through training to others.

Some 30 years ago an engineer named Taylor was in charge of a mining property. The property, I assume, wasn't paying very well and Mr. Taylor began looking around to find ways and means for improving the situation. He found that a few of his ore shovelers, without apparent effort, were shoveling two or three times more ore than were the rest of the men who were working with them and under exactly the same conditions. This interested Mr. Taylor and sitting down he made a study of the movements of those men who were the best shovelers. He analyzed the job step by step as it should be done. On the basis of this analysis he began to train the poorer shovelers. He found that he could take an ore shoveler and by training increase his shovel work from 16 tons to 59 tons a day—*without tiring the man*—an increase in results of 377 per cent.

Last spring, in April, R-6 held a training camp for so-called "Fire Assistants". Among other things accomplished at this camp, we made an analysis of the short term protective organization. As a means for finding out what should and what should not be taught at the guard training camps held each spring on each of our 22 Forests, we began with the activity of Fire Control and stepped it down, one step at a time, through (1) positions.

(2) major duties (such as dispatching and fire-chasing), to (3) the ultimate job. We then attempted to analyze each job into "What does he do?", and "What must he know?"

Considered from the standpoint of the objectives set up for this training camp, the results secured from this method of analyzing the job (the group conference discussion method was used) were very satisfactory but the plan presented one very weak point which was recognized in advance, but which, under the circumstances, could not be very well avoided. The men in attendance at the camp were experienced fire organization men and they knew every angle of the fire control activity, but when it came to the important measure of analyzing the ultimate jobs in the general breakdown, *they had to depend on memory* and, as I have tried to prove in the example of the overcoat job, memory is a very uncertain factor.

It seems to me that what we as forest officers should try to develop in ourselves is the ability to analyze the ultimate job *on the ground, while the job is actually being done* with the purpose of (1) finding out what in the performance of the job is essential, (2) removing non-essentials which are due to habit or tradition; and (3) determining through this process the "one best way". After the "one best way" is isolated, then we should use it as the basis for our personnel training program.

At the training camp mentioned above, we learned even with only the help of "imperfect" memory that we had been spending a large amount of valuable time at guard training camp in training the guards to do certain things which were entirely foreign to the particular jobs for which they were responsible. For example, it was found that the instructors at nearly every guard training camp were teaching the men how to install telephones, when as a matter of fact, the ordinary guard is never called on to install a telephone. In most cases the ranger, or some special man, does this in advance of the fire season.

Another example, which came to most of us with more or less of a shock, was the job of teaching "how to make a standard splice in a No. 9 telephone wire." By force of habit or tradition, this lesson has been taught for years in practically every one of our guard camps but our analysis showed that the ordinary guard on many of our Forests is never called on to make this splice. He isn't even furnished with the tools necessary to make it. We did determine, however, that every guard should be taught how to make an "emergency splice" (made without tools) and to make it well.

Job analysis, it seems to me, is not only an invaluable device for determining what should be taught in our personnel training programs but it may be put to use in even a broader way. Recent developments have led me to believe that nearly everything we do needs analyzing.

The Forest Service as we know it today has been running along for some 27 years. During this period many traditions have grown up to influence our habits of thought and action and these in turn have resulted in our acceptance of many standards. Are we accepting these standards as a matter of course? Do we ever pause and, in the light of changing con-

ditions, analyze these standards? What effect, for instance, is the extension and improvement of our road system and the motorization of our field force having on work and supervision within certain of our administrative units? Are we, with our existing standards, or even with our time-honored form of organization, keeping up with the times, or are we still, figuratively speaking, operating and thinking in the era of the horse and buggy?

For some twenty years the Western Regions had been using fire finders graduated with azimuth circles while the compasses used as adjuncts to these fire finders by fire chasers and others, were graduated into 90 degree quadrants. I wonder how many fires during this long period have been missed, with the accompanying loss of time and costs, as a result of errors in converting azimuth readings to compass bearings? Finally some one discovered that these errors could be eliminated by simply substituting the old compass graduations with new azimuth circle graduations like those used in the fire finders.

It took nearly as long for some one to discover that our efficiency could be improved and much time could be saved by "cargoeing" our packs at the warehouse instead of waiting to do this job in the field during the rush and confusion of a fire emergency.

The Western Regions drifted along for twenty-five years with their ranger positions arbitrarily allotted until Earl Loveridge made an analysis of the ranger's job and found, on the basis of work loads, that these assignments were all out of adjustment between regions.

There may be other improvements and cost-saving ideas awaiting discovery that are even more promising than those mentioned. Based on your experience, how long does it take to discover, develop and put across in the Forest Service, a new idea of merit? We are no doubt making progress. but twenty-five years, ten, or even five years, is too long a time to wait for developments such as those cited above.

I think it is generally agreed that personnel training is a fundamental activity in the work of nearly every forest officer from the Forester down. In pursuing this activity let us give the training work a reasonable break by analyzing the jobs that are to be used as the basis for the training program. Let us not spend time and energy over a period of fifteen to twenty years, in teaching men how to convert azimuth circle readings to compass bearings when it isn't necessary.

GANGWAY!

by

THEODORE SHOEMAKER, *Supervisor, Lolo Forest*

It has long been evident to me, and no doubt to most men who have handled fire crews, that one source of lost motion is in the bunching of men and the interruption one with the other as they pass forward on the line. If the thoughts of the men were all uttered the woods would ring constantly with the cry "Gangway", "Gangway", "Gangway".

We have tested out in the training camps and on the few crew fires which we had on the Lolo this year a system of distributing and moving men forward which seems to possess possibilities of materially cutting down this lost motion and speeding up the job from 30 to 50 per cent. I will try to describe this method so that others may test it out if they desire.

Line up the crew (each man with a shovel and pulaski) at the point of attack, with a strawboss at the head and the foreman at the rear. The foreman directs the men to stay in line and keep 6 to 8 feet apart for safety, and the strawboss to lead the crew slowly forward along the edge of the fire as close as practicable for comfort. No one is to perform any work until told by the foreman. The last man in the line is told to stick his shovel in the ground at the point of beginning, clear the line to the next man's shovel, trench back to his shovel, then mop up the edge of the fire until moved ahead. The foreman falls in behind the next man in the slowly moving line, stops him at the distance of one chain (or at such interval as best suits the conditions at hand), gives him the same directions, and so on until all men have been assigned an individual stretch of line. A second strawboss, who will later take charge of the mop-up work behind the line construction, starts in immediately behind the foreman and proceeds along the line of workers directing each one individually in the width of clearing and the kind of trench to build. (Incidentally I agree with White that most of the trench we build is a dead loss, and therefore on most fires we may as well go directly from a lightly cleared line to mop-up.) The strawboss at the head will take up similar duties from his end of the line, working back toward the center while the foreman makes sure he is doing it correctly and then drops back to check on the methods used by the strawboss at the rear, incidentally lining up individual workers as he goes, and sizing up progress against the next move forward.

As the individual sections of line near completion (including sufficient mop-up work to make the line safe counting that a mop-up man will be dropped back for each 5 chains of line) the head strawboss again works to the lead and the foreman and mop-up strawboss to the rear.

The move forward is effected by the foreman picking up the rear man, preceding him along the line to the next man, who falls in next the foreman but ahead of the worker behind him, and so on until the entire crew, except those dropped back for mop-up work, are at the end of the constructed line where they are led forward again and distributed as at the start. (Each man carries forward the tools he started with.)

The advantages of the system are:

1. There is absolutely no congestion while at work or interference in

moving forward on the line. No worker passes another either on the job or in moving ahead.

2. Each man receives individual instruction which results in just the kind of line needed on the particular piece of line being built by him. Useless clearing, wide trench, and misdirected mop-up work are thereby eliminated.

3. Each man is on his own, and the shirker cannot cover up his failure: whereas the men are stimulated by a friendly rivalry to do their section as quickly and as well as the next fellow.

4. The foreman has a chance to study individual men and select the best to hold when the crew is cut down to a mop-up basis. The desire to be retained for longer employment also acts as an incentive to the men.

5. Having men equipped with a shovel and pulaski enables them to do anything necessary, as cooling down hot spots, going out after spot fires, dropping back on mop-up patrol, etc. In attacking a fairly hot line the men can stick their pulaskis in the ground to mark the end of their sections and go ahead with the shovel and cool the fire down before clearing and trenching. There are always ample tools on the line where needed and at no extra trouble or cost.

6. Weaknesses of foremen and strawbosses come to light and can be corrected by the Forest officer. At the same time the individual workers begin to acquire the technique of the job. This makes of every fire a training school, in a science in which training is sorely needed. A trial of this method with some of your best foremen on the job will bring a realization of the need for foreman training better than anything I know.

7. The element of personal danger is greatly reduced.

8. Mop-up work starts almost from the beginning and is continuous until the fire is out, thereby hastening the time when the crew can be heavily reduced as well as the time when the fire is dead out. It is under constant and direct supervision, for, as the line strawboss and the individual workers learn their jobs, the foreman has time to check back with the mop-up strawboss to improve methods and to determine the extent to which the individual beats may be lengthened as the line cools down.

9. Strictly individual responsibility both in construction and mop-up is attained by the definite marking of sections or beats, and nothing can contribute more to good work than this. At the same time dead beats are speedily detected and discharged, which builds up the respect and support of the good men of the crew.

10. Change of work from swamping to trenching and then to mop-up is not so tiring as a steady grind at one thing. Men can do good work for longer periods. Learning all departments of the job makes for increased usefulness of the individual and greater flexibility when a change of plan is necessary.

I realize many questions will arise in the reader's mind, such as "What about saw crews?", "What about use of plows for trenching?", etc. I will

not undertake to forestall these doubts as to the applicability of this system to particular sets of conditions, but will content myself with saying that we have found it can be adapted to line clearing only by supplementing the individual men with enough saw crews to keep the work in balance. After the first move forward everything is working smoothly and saw crews themselves will have a larger output if assigned sections as are the individual workers. Incidentally I am convinced that saws are a greatly overworked tool, and contribute heavily to unnecessary work and high costs. As to plows, our training camp tests, using the same crews on the same ground, show that about 30 per cent greater output of held line can be had from this system with a light hand-built trench than by using a plow with the ordinary mass attack on the clearing job.

I regard it as a hopeful sign that men are beginning to realize that the trench, whether a light one built by hand or a more formidable looking one with a plow, represents only 10 per cent or less of the whole job, and that therefore other lines of experimentation to cut costs offer greater promise than does the attempt to force the use of the plow whether or not the ground permits success with it, or indeed whether or not any trench at all is necessary.

Note: This paper was written for another purpose, some time ago. It occurred to me however that in reality it had a close relationship to job analysis—in fact I believe the method originated from an analysis of the suppression job by a group of rangers. Possibly you would like to discuss it from that viewpoint.

P. K.

REVIEWS

Job Analysis and The Curriculum, by Strong and Uhrbrock,
Published by the Williams and Wilkins Company

This book is the result of a study made in the Division of Cooperative Research in the Carnegie Institute of Technology, Pittsburgh. The purpose of the study was to develop a method for determining scientifically the content of a curriculum for a technical or professional school. In the past there had been no method, at least no satisfactory method for determining what courses should be included and what might be left out. Decisions were based on opinion, the opinion of students, of professors, of the alumni, or of professional associations.

One professor would think it more desirable to add an advance course in electrical engineering than a course in elementary economics while another would favor the economics. Much could be said on either side and with no measure to determine values, the decision went to the strongest demand. To get at a measure or a method there must first be an objective. What is the purpose of the course; what is it trying to do? This was needed as a basis on which to evaluate conflicting opinion.

The study was made in the field of commercial printing, the objective being to educate men for executive positions in the printing industry. Early in the study it was agreed that the aims of education were "to prepare men (a) to earn a living, (b) to assume the duties of citizenship, (c) to enjoy life. This study was confined to the first. In the final curriculum courses were arbitrarily added with the second and third aims in mind, but the choice had no systematic or analytical basis. It might be found on analysis that the three practically coincide; it is at least evident that the first contributes very largely to the second and third.

Since, then, the aim of the course was frankly to enable men to earn a living as executives in some commercial printing organization, the first step was to find out what an executive in this field really does and what he must know to do it. The method of determining these two things was to analyze the jobs of printing executives in a number of representative companies. The methods they used in making this analysis need not concern us. The important thing is that it was carefully made in great detail with the cooperation of the executives concerned. It was found that the executive work was much the same in the small plant as in the large one, the difference being in quantity and the ways in which it was subdivided and grouped. The assistant manager in a small firm might do work done by a foreman in a large one. However, the work remained the same. Furthermore, it was found that there was much overlapping of duties as well as shifting of men. Courses could not therefore be designed for positions, as for example, a foreman's course and a president's course and a manager's course. It is not the function of a college to prepare men for a specific job, but rather to prepare them for an activity in a given field in which the individual may eventually find his place.

It was found, therefore, desirable to add to the two basic objectives of the analysis—what he does and what he must know—three sub-objectives.

First, qualifications not essential but of value. This would include information which the executive ought to have to handle the job better or with greater ease or satisfaction. Next, the route which each official had taken to get to the job, and last, the probable route of promotion.

Two jobs were found that were universal: All executives "used English" and all "handled men". The first, of course, was analyzed in a great deal of detail to determine just what the needs were, how it was used, the most difficult requirements as well as the most numerous. It was found that the most common uses such as writing letters and giving general oral instructions gave little trouble. A less frequent but more exacting job was "getting out an accurate bid for a printing job from printing specifications."

In the beginning it seemed to be the general opinion of educators that a course built on such a basis would be narrow, elementary and inadequate from a college educational viewpoint. But as the work progressed it was found that a number of innocent looking jobs when opened up by analysis showed many divergent lines some leading to unsuspected depths. For example, one job found in every plant was "buys paper".

When analyzed, it was found that the buyer should be able to make both quantitative and qualitative analyses and determine the presence of wood pulp, plant fibers, clay, rosin, starch, cellulose, hydrate, aluminate of soda, silicate of soda, gelatine, and case-in. This involves considerable basic chemistry. He should also be able to use the microscope in identifying the qualities and grades of paper.

In the other direction, it was found desirable that the executive have some training in sub-executive work such as press work, bindery work, etc. It is not essential, however, that they become experts in these lines. The essential thing is that they *know good work and how long it takes to produce it*. To this end the curriculum included shop processes, both hand and machine, in these grades.

Above we mentioned two jobs common to all executives. The second, handling men, is an example of a type of job that is very difficult to teach and for which it is difficult to write specifications. Just what does a man do when he "handles men?" He plans work, he supervises, he introduces new men to their jobs, and many other things. But we are still not down to the ultimate act, the thing the executive does when he supervises, etc. The fact is that there are so many variables concerned that no one best way can be set up. Sometimes he does one thing and sometimes another depending on the men and the situation. But even so the preparation for such work is not absolutely hopeless. What is actually done depends on the executives judgment as to what is best, and his judgment, in turn depends on his basic information concerning men, work, and situations. So the "what he should know" phase opens up a wide field requiring careful selection of basic material. This will furnish the background on which actual training on the job can be based in the industry after leaving school. Such background courses would include psychology, organization, personnel management and others, but courses in these subjects prepared with definite job specifications in mind.

As a result of the study a four year college course for printers was prepared based on the job specifications actually found in the industry.

My purpose in reviewing this book is to get from it such suggestions as we can for the solution of our own problem. Our training problem is different, though related. Education covers a broader field. It trains men "to earn a living" in an industry. We train men for a specific job. But even that statement is too broad for most of our work. Mostly we train men to do specific jobs. Even so is not the process pretty much the same? Is not our instruction based on the same two questions, what is done and what must be known?



REVIEW

Research in Overalls: From an editorial in Factory and Industrial Management

At a meeting of the Society of Industrial Engineers, James McKinsey was asked how much his Company—Phoenix Hosiery—was appropriating for research. He named a relatively small sum but said that a very large part of the real research work was a by-product of line duties. For example, the general manager, who is constantly studying conditions and trends, gets an idea which he thinks may work. He suggests it to some one in the department interested, perhaps a foreman or a skilled worker. It is discussed and possibly experimented with. Or the idea may originate with the workman. If so he develops it to a point where he needs more time or help, when he in turn consults the foreman or manager. In either case if the idea seems worth following up and is time consuming it may be assigned to a staff engineer or the line man may be taken off his job for a while to play with the idea.

This is a commonsense practical idea of research which takes much of the mystery out of it. It seems to be gaining ground in many of our most progressive industrial organizations.

This is essentially the idea of the Service committee on administrative studies as expressed by Mr. Sherman in his letter of March 31, 1932. This letter says that our aim is to deal with local problems for which there is *immediate* need for improvement. It also sanctions "informal" studies without waiting for formal plans or formal approval. This makes it possible for the administrative man to take time to "play" with ideas or improved methods. A very large part of our industrial progress has resulted from just such informal study.



REVIEW

Recent Social Trends in the United States—Findings of the President's Research Committee

In the fall of 1929, the President appointed a committee of scientists, headed by Dr. Wesley C. Mitchell, to make a nation-wide survey of "recent

social trends". This is one of a series of surveys sponsored by the President, beginning while he was Secretary of Commerce. Such surveys are necessary and are particularly valuable in periods of rapid change. In spite of present-day criticism, it is probable that history will record these studies as outstanding achievements. The report, including special studies, is being published in thirteen volumes.

The report covers so many factors that it is impossible to mention more than a few. It, of course, discusses the rapid technological changes which have attracted so much attention of late. It shows how inventions pyramid, and that the indications point to continued increase. In fact, the inventions now in sight, when perfected, will continue the increase. It shows why these changes are dynamic in their effect on social customs and create an increasing number of social problems.

The facts concerning population change are interesting and important to us in relation to the development of our forests, particularly recreation. The increase in population is slowing up at a remarkable rate. Not more than 132 million are indicated by 1940 and possibly not more than 145 million by the end of the century. An industry can no longer plan on large increases in population.

The shift of interest from the producer to the consumer is an outstanding change, the results of which cannot yet be foreseen. In the past the consumer got little consideration. A measure that would benefit the producer was considered worthy with little regard to adverse effects on the consumer.

The improvements in communication and transportation have produced so many and such varied changes in our institutions and modes of living that they are impossible of evaluation. The first result was a movement toward the city, which created new modes of living, new forms of crime, with new social institutions to meet and cope with them. The movement now is back toward the country or at least toward smaller social groups. Any such shift creates new problems and new periods of adjustment.

Probably the most important feature of the report is its recognition that these many rapid changes have created many serious problems—problems of such magnitude that there is no assurance that they will be successfully met. It recognizes that technological change has been faster than social change and that social customs and institutions have changed more rapidly than our social philosophies and our fundamental habits and beliefs. These differences in the rate of development or change has thrown society out of balance. Adjustment and coordination is needed. But as a basis for adjustment there is a need for more systematic research in social sciences. The physical sciences are relatively overdeveloped. As a result of this lag in our philosophies and beliefs we find the persistence of our pioneer ideas of thrift and industry in a wage-earning industrial society where workers greatly outnumber jobs. We find also a persistence of the belief in laissez faire in industry together with a strong and increasing tendency toward restrictions, cooperative action and governmental regulation. In spite of prevailing beliefs and organized opposition, the trend indicates a continued

broadening of the influence, the authority, and the activities of Government. The fields of both social and economic planning will be broadened and enlarged. An industrial and economic council in the near future is indicated. The beginnings in industrial planning are already under way. If the country was as united in its desire for social welfare as it was in its desire to win the war, progress would be rapid, but as it is there are conflicting aims and conflicting beliefs. "The fundamental principles are that social problems are products of change and that social changes are interrelated." * * * "These interrelated changes which are going forward in such bewildering variety and at such varying speeds threaten grave dangers with one hand, while with the other hand they hold out the promise of further betterment to mankind."

To the Forest Service these opinions are extremely interesting because of its location in the midst of these conflicting forces and influences. It is itself a part of the movement, or better perhaps, a result of the expansion of the functions and purpose of government. It is a creation of the "service" idea rather than the control idea. It is in a position to be influenced by and to influence the attempts at economic or industrial planning. From reading the report one gets the idea that both the opportunities and the dangers to the Service are greater than ever before. Service men should read the report.

SUGGESTIONS FOR DISCUSSION

The subject about which I should like your opinion is this question of job analysis. Not job-load analysis as discussed by Loveridge in the new manual on that subject, although the one may include the other. What I mean is the analysis of the ultimate job, the thing the man actually does—not “grazing administration” but “counts sheep”. Hodgson has discussed it. I reviewed a book on it. It sounds so reasonable to me that training should be based on the things to be done that I cannot ask you to discuss that. And further, it seems axiomatic to me that a job analysis is the best way to make sure that you know how to do all the things that are to be done on the job. Not just a “memory analysis” as Hodgson calls it, where you try to remember what you do, but an analysis on the job where the job is done and where different ways can be considered. Just writing down your way of doing it has value, but even that is scarcely an analysis. But suppose you get three or four good men, have each do it and study and compare methods, not the complete method but every step and detail. When you do that then you are on the road to what Hodgson calls the “one best method”. Most of you have played golf and know with what detail every move has been analyzed in that sport—the position of the hands in grasping the club, the position of the feet, the eyes, etc. Or in football: the coach did not just tell you to “block” and leave it to you to figure out how; he told you and showed you and criticized you in detail and then had you do it and do it until you began to get the idea. You know it is admitted by educators that the coaches are the most scientific in their methods of instruction of any teachers in our colleges today. Why? Because they have analyzed their job until they know exactly what they want to teach and have worked out systematic methods for putting it over. They do not depend on lectures although they use them; they teach theory but they do not stop with that; they use every available method and all directed toward a single end, they do these things more than others because as a class they have learned to analyze the job.

That I fear is too much of a digression but the point is that the value of analysis is too evident to permit of much discussion. However, it is not always so easy as what has already been said would indicate. It works well on tangible or repetitive jobs, but we have many jobs that are not repetitive and where each new situation contains a different combination of common elements. Suppose the job is to contact a critic of Service methods and win his approval and good will. How analyze that? Just what does one do? The fact is that it is never done the same way twice. Writing definite “job specifications” is therefore impossible. Then is any sort of systematization impossible? It seems not. Two methods of approach have been tried, both seemingly with good results. One is what they call a “difficulty analysis”. You analyze situations of that kind to determine what difficulties one is apt to encounter and methods of overcoming them. This gives you a better idea of what you may expect and prepares you better for meeting whatever may come up. It is one thing to tell a ranger to win good will and another thing to give him some idea how to go about it. Supervisors who analyze situations and help their rangers to recognize difficulties and work out plans for meeting them, somehow seem to be

getting results.

Another approach is to work out the characteristics of successful methods. One probably would be to know your stuff. Did you ever jump in and then find out when it was too late that you didn't have the information needed? Other characteristics were mentioned in a recent bulletin article.

If it is already being done why bring it up? Do Supervisors ever train rangers without knowing what they are doing? I could give you a lot of examples but most of them are old. For example, a few years ago orders were issued for two guard inspections per month, but no job specifications were included for an inspection. Rangers were supposed to know how—intuition I guess. The result was the ranger visited the guards, gave them the latest scandal from the settlements, looked around a bit and went on. Were the rangers at fault? Not at all. They did the job as it was given to them. That I understand has been changed. The specifications for an acceptable inspection are definite and extensive. The same trend is true for range inspection.

While much has been done there still remains much to do. Men are still given jobs in an indefinite way and criticised for doing poor work because they did not do it the giver's way. If you want to develop a man's initiative let him develop his own methods but do not criticize him for not developing yours. Too much of that is still being done. Not long ago I saw the records of a case where a man was demoted with nothing in the record to indicate that he had ever been trained.

This is really the important question, I think, making sure that the job is covered, but there is left that important element of teaching the "one best way". That is important because it usually saves time and gets better results but also because it is so hard to unlearn a wrong way. If you teach a beginner a poor method you are probably fastening it on him for the rest of his life. The hardest job we are ever asked to do is to change our work habits.

Then, there is the question of poor standard practices that go on and on for years before they are discovered. Hodgson mentioned some. Here is another: At the Mather field meeting in 1921, a supervisor suggested a lighter shovel. It wasn't even considered. No, a big shovel would move bigger piles of dirt, besides we were big, strong men and *wanted* a big shovel. Ten years later, in 1931, the light shovel came into common use. Other examples could be given now, and still others ten years from now.

But to come back to discussions: as I said before it is useless to discuss the desirability of determining just what is done and what must be known before attempting to teach a job or activity; that will be generally accepted. It will also be accepted that job analysis is one good way of getting at these two things and making sure that nothing is overlooked. If desirability is accepted then the thing left for discussion is its practicability or feasibility under normal working conditions. Even if a good idea, what can we do with it?

QUESTIONS

1. What about the feasibility of job analysis of the ultimate job (as explained by Hodgson's illustration) under normal working conditions, as a preliminary step in job training?

2. If feasible, how can we get it into general use? You know the Service and its limitations. In other words, what can be done about it?

3. What is your idea about training in "intangible" jobs? Can we do it or must we depend on each man working it out for himself?

May we have your discussions by March 25?

DISCUSSIONS OF LESSON 14

The discussions, I think, indicate that we are making progress in the use of costs. It is not an easy subject. We are just getting started on a system that gives us reliable costs for the first time. Not having them in the past we learned to do without them. We are not inclined to jump at new ideas. Old habits persist. But in spite of all these inhibitions we seem to have made considerable progress in the use of our new tool. Costs, as a tool, is not one that anyone can just pick up and use. It requires a lot of study and experimentation. No one in any industry has as yet found the last answer in the use of costs.

Most of us seem to overestimate two things: first, the ease with which industry (a factory) can determine true costs, and second, the extent to which industry uses costs. Good cost records in any industry are hard to get and very few organizations have them. I used to attend the meetings of the Cost Accounting Division of the Chamber of Commerce, in Denver. The industrial expert employed by the Chamber could give us innumerable examples of business that had left Denver because Denver firms did not know their costs; also business taken on at a loss for the same reason. Business in general does not know costs and business men in general do not know how to use them. Give us another two years to get underway and we will be well above average. But average never has satisfied us in anything, and we will still have a long way to go.

Costs are of greatest use in most industries for current operation control. This use is slow in taking hold with us because to do so it must replace well developed techniques for the same thing. Cost summaries at the end of the year have the disadvantage that by that time the money has been spent and no corrective action can be taken. Such studies however, have their value in making future plans and in indicating trends. This use seems to be developing more rapidly, with us, than others and quite a lot of progress has been made.

P. K.

K. WOLFE

FLATHEAD

KALISPELL, MONTANA

1. While I agree with Hutton's proposal that regular salary costs would be more useable if it were possible to post them currently I am at a loss to know how it can be done. Leave with pay, whether it be sick, annual, compensatory time or accumulated furlough, is the monkey wrench in the machinery. If, for instance, I take twenty days accumulated furlough in May and receive what we now have to accept as a full month's pay, what rate per hour is to be charged against my May working time?

I can think of one or two possible solutions but they get so blamed complicated before I get very far in attempting to follow them through that I get discouraged. If it could be done by some simple process it would be fine—but I don't believe the value to be derived is worth the cost if a complicated system has to be used. Approximate costs per man hour of Rangers or other yearlong employees' time are satisfactory for current cost analyses anyway and wage costs of temporary men can and are quite readily posted currently.

I can't agree with the idea that costs are not taken into consideration in our current inspections. On the two trail jobs that Hutton mentions I can see no reason why all of the records necessary for a comparison of costs aren't available to the Supervisor or inspector right there on the ground—and surely there is no better place nor time to make use of them. Even if the exact cost of ranger time isn't known the number of hours or days is, and that, to my mind, is sufficient.

The cost analysing job, based on approximate figures but done on the ground at the time the work is being performed, is far ahead of one based on exact figures done six months or even one month later. In fact, it's my idea that if we make as much use of this method as is possible, it won't be necessary to keep our office cost records by Ranger Districts except for particular activities which we may want to study now and then.

While I used the term "exact cost" in the foregoing paragraph when referring to voucher register figures I really didn't mean it. There "ain't no such animal" and the greater the volume of records we attempt to maintain the farther removed is the result from the word "exact". Too many different conditions come into the picture, which because of their number bring with them uncertainties which cannot be run down and straightened out. The way to get around this is not by increasing the volume and adding still more figures but by the "sample plot" method. Select representative projects or parts of activities and concentrate on getting complete information on which to base comparisons. It will then be much easier to get everyone concerned to appreciate the value of the data being assembled and they will do their best to keep reliable records which will be useable, accurate, worth their cost, and not burdensome to the entire organization.

I agree that we are inclined to think of the time of our regular personnel in terms of hours or days instead of dollars. This, to my mind, is not a fault of the system—it's a fault of our mental process. We need to get into the habit of *thinking* dollars even though they are recorded as hours and days.

2. If there is a mathematically correct method of distributing general overhead it has failed to make itself known. This being the case and as long as conditions differ on different Forests and on the same Forest at different times I do not believe it practical to establish any hard and fast rules for this proration. My hunch is that none of the four samples given in Wilson's article are as correct as they could be made if the leeway permitted in the present instructions was brought into play. He has taken extreme possibilities which, as he says, are in accordance with instructions—except that the instructions state that the judgment factor shall be applied when the method used tends to throw too much overhead on certain activities. Take Timber Sales on the Sitgreaves for example—judgment will not enable the Supervisor to say exactly what percentage this activity should receive of the General Overhead, but it will enable him to determine that 24% is entirely too low or that 38% is entirely too high.

Have you ever noticed in your own time charging how simple it is to charge to Pre-Suppression, Prevention or any of the other activities where you don't have to subdivide to projects and how much more compli-

cated it is to charge to Imp. Construction where individual projects must also be shown? A part of the trouble lies in the fact that we are inclined at times to be just too lazy to take the trouble necessary to subdivide by projects but most of it is because instructions tell us to charge to General Overhead when it isn't practical to charge to projects. If we spend a day building a fire plan it's simple to charge the time to Presuppression, but if that day was spent in reviewing the Comprehensive Improvement Plan we have to charge it to General Overhead. The result, to my way of thinking is that the activities which require subdivision of time to projects don't get their fair share of the direct charges. This in turn means that they don't get as large a proportion of General Overhead as they otherwise would. Why not broaden the instructions concerning the use of "General" classifications as subdivisions under these activities and then prorate this time to projects at the end of each year?

J. W. HUMPHREY

MANTI

EPHRAIM. UTAH

1. (a) In the winter, usually in February, it has been customary to make a very close check of the activity costs of all officers, at least for all the principal activities. At this time, a table showing the operative costs between ranger districts is prepared. These cost figures always reveal discrepancies that are difficult to explain. The table shows days worked, by months and by year, hours per day, miles traveled per day, number days horses are used, auto mileage, expenses for forage, subsistence or per diem expenses, etc. This data, with its analysis and comments, is furnished to all the officers, and constitutes our principal winter inspection.. Outstanding inconsistencies are of course kept in mind to be checked in the field during field inspection the following season. The trouble with this system is that much of the data collected is completely overlooked and the next year, we will likely find just as great variation except perhaps that the inconsistencies of the year before may have been corrected. Possibly we should substitute a monthly or at least a quarterly recheck for the present annual system now employed. The above applies only to the time of Forest officers. A careful check of the cost of improvement work is made currently.

Operative or other cost figures should throw light on many of the things we will want to check over in our inspections. We should not overlook, however, that there are so many factors to be taken into consideration in making a field inspection that cost figures may not always give us the correct slant on what is being accomplished.

The value of detail is the surprising and unlooked for items which are brought to light. Too much detail may result in the development of an unfavorable attitude on the part of the officer making the study, toward the information sought because of the burden the study imposes. The fact that the allotments to the Forests are so definite and so securely tied for specific purposes rather discourages a study of costs since after all the study may mean no more than a careful consideration of the time element necessary for the different activities. No changes in the total operating costs for the Forest results from the study.

(b). There is no question but what the dollar value of time will be

more easily visualized than the same proportional values represented in hours.

(c). The need for detail it seems to me, even for job costs, may be overstressed. If your improvement crews are working to advantage, your foreman or the officer in charge should readily discover the trouble, should his organization be unbalanced. Detailed job costs are interesting and they are also valuable in making up your estimates for future projects. I do not see where they offer a great deal of help on the job.

2. The suggestion that cost reports be tied more closely to our work plans may provide the opportunity to secure more uniform time distribution on the various activities and be of real value if used in followup in field inspections.

3. Supervisor Simpson has shown in his paper that the cost of maintaining Ranger stations for the limited use they are given may be difficult to justify. I believe, however, that it is good business to consider the value of proposed improvements in the way he suggests. As a matter of fact, the number of days put in at most of our ranger stations will show the daily cost to be higher than the cost of stopping at an ordinary hotel for the same period of time. We cannot get away from some of these high costs of housing Forest officers. I believe, however, we should be very careful in the consideration of new buildings in the future since on many districts, with our present system of roads, it may be cheaper to provide a station on wheels in the form of trailers rather than permanent buildings.

4. About the first thing I discovered in the study of cost records was that it was cheaper for the Supervisor to hire horses than to own and feed them at Government expense.

Two years ago we discovered that standard lumber toilets for camp ground use, could be bought on one district and transported to another district at a lower cash outlay than the toilets could be constructed on the other district even though the material was purchased under bid and the buildings were constructed on contributed time by the ranger. There are a great many other similar cases too numerous to mention where small savings have resulted from cost studies. Just how much detail was necessary in all cases to be worthwhile has not been worked out.

I have been wondering if the variations possible in time distribution for different activities as shown by Wilson (and other examples could be given) is not responsible for the skeptical attitude toward cost studies of many officers. What do we do where we find such glaring inconsistencies? The instructions are amended in the attempt to get more uniform cost is all. You are still going around within the original allotment to the Forest or the particular activity that is out of joint.

W. R. KREUTZER

ROOSEVELT

FORT COLLINS, COLORADO

Mr. Hutton has brought out very clearly the need for the actual use in supervision of the information secured through our new costkeeping records.

We made a study for 1931 of our Rangers' Administrative Plans. We

used analysis job forms showing the "jobs", "Budget of Time" set up for each job and "Time Spent" on each job as determined by records made by the rangers. This, while expressed in "Units of Time" and not "money", served as a limited checkup on the use of the Administrative Plan from month to month during the period the work planned was being accomplished.

If the analysis had been converted into dollars and cents thus indicating the cost for each job completed, it is believed the analysis would have been far more valuable as a control to the supervision of the work set up in the plans, time budgeted, and time actually used in completing the jobs.

The Forms 26 furnish costs by time expressed in hours. This may be converted into dollars and cents and readily arrived at for each of the 48 activities shown on the form.

Form 43 is more striking to us since it expresses the costs by activity expenditures in dollars and cents by fiscal years for the entire Forest as a unit.

A progress statement of finances in connection with a Forest Road project, used as a financial control on the job by the Supervisor, was prepared from our accounting records. It showed expenditures by items, and from these figures it was not at all difficult to estimate the cost of the work yet to be completed, estimate by the day, by the month, and the total to complete the project. Thus we have at all times on the job and in the office the financial program, both present and future, while the work was being executed by the laborers.

The cost statement by Ranger Districts should be of considerable value if expressed in proper units of cost. It appears that Mr. Hutton had his statements prepared by activities by Ranger Districts (similar to our present Form 43 only by Ranger Districts). The fiscal year seems too long a time and a statement for this period after the work is all done does not seem to me to be an effective financial control. What is needed is a control to be used while the work or jobs are being done, not after they are done.

It has always been my personal opinion that Administration Plans of Work should be made to conform to the forms used in keeping our costkeeping records.

The units of work, i. e., jobs, projects or labor, and time, materials overhead and costs should be in agreement in both the Administrative Plans and the Accounting System. This would make for an effective and simplified system of control or supervision based upon actual cost figures.

J. W. FARRELL

CHALLIS

CHALLIS, IDAHO

1. (a) The comparison of costs with results in the field is surely one practical method of determining our real success or failure. Such comparisons should be made currently but yet it seems that our cost accounting lags behind our field accomplishments. I am wondering if it is not up to some of the field officers to work out their own expansion accounts, rather than to depend entirely upon the clerical force at the Supervisor's Office. Often times I have tried to determine, or come to some definite decision, as

to why one certain Forest Officer seemed to get results while another seemed to lag behind. The former Officer was, no doubt, commended for his accomplishments. Later analyses and attempts at analyses of cost data revealed that the difference between the two men might be measured in the expenditure of funds, or the cost of comparative accomplishments.

As others have pointed out, I believe that our cost accounting procedure should be consistent; we should occasionally search out the route of every dollar expended, so that we might be more nearly able to determine whether our cost figures on one expansion account have been unintentionally reduced at the increased cost of the other activities. The appropriate charge for some item is doubtful. Do we always place such a charge to some activity on which we have set up an expansion account, or is it the tendency to throw such marginal charges to other unaccountable activities?

1. (b) The value of our time in dollars should be the ultimate object, and should to my way of thinking be occasionally analyzed in this respect.

1. (c) I have attempted to approach this subject under the discussion under (a). It is my opinion, however, that we should limit our expansion accounts to the doubtful items, and thus not make our cost accounting system too burdensome.

3. Mr. Simpson's article is at least enlightening on the project under consideration. If we could apply cost accounting to every problem in such a concrete way or by such a mathematical formula as we have in this case, it would be possible to determine the justification or lack of justification for many activities.

C. L. VANGIESEN

ROOSEVELT

FORT COLLINS, COLORADO

There is no doubt that our cost accounting system to be of value must produce data which are primarily useable by the administrative men. I will agree with Supervisor Hutton that for many activities expansion accounts may be necessary to reflect true conditions. Periodic reports on improvement and certain other selected projects may be desirable. In general, however, I feel that our Forest clerical forces are entirely inadequate to furnish monthly cost sheets by Ranger Districts and projects, some of which might be carried on an expansion account basis. For some activities these data would in any event be worthless from the standpoint of the administrator. In order to prove his points, Mr. Hoffman has naturally mentioned only activities most adaptable to cost studies. It is obvious that there are many of the other activities such as the various types of cooperation, and fire prevention, which would be practically impossible to study from a cost standpoint. Also these activities would have an undesirable bearing on the activities he mentions.

It has been often stated that cost accounting figures should be as valuable to the Forest Service as to an industrial enterprise. I cannot agree with this. Our organization set-up is entirely different from that in industries. The "jack-of-all-trades" which describes many Ranger positions, has gone from present-day business. The ordinary Ranger of today, with inadequate allotments, must repair the break in his pasture fence, put in a new trail

bridge, paint his dwellings, type reams of reports, and do hundreds of other jobs of sub-ranger calibre. When I worked at a machine for the Ford Motor Company, I was not required to inspect the work done or to report production. In other words, as long as we require our Rangers to do such a large amount of sub-ranger work at variable times during the field season, any cost figures must be reviewed with considerable liberality. The cost of maintaining a pasture fence by contributed time will be considerably higher than if done by labor and paid for from an allotment. On some districts, a Ranger must spend at least one-tenth of his time typing letters in answer to inquiries from the public. The number of public contacts which must be made on some districts is several times greater than on other districts of equal grade. As long as Rangers are required to do a large number of jobs such as labor and typing, with costs all out of proportion to accomplishment, will a study of activity costs be very reliable? The Ranger might be increasing the cost of grazing if he was not doing trail maintenance work or typing. Also, who has any measure of accomplishment in cooperation and public relations work which can be balanced against activity costs.

Mr. Wilson's paper should stimulate some worthwhile discussions from executive assistants and members of the fiscal offices. There is apparently a need for more standardization in the computation of overhead costs.

The study made by Supervisor Simpson is very enlightening. There is no doubt that we should all make studies of this kind. We cannot, however, overlook the fact that one of our functions is to serve the public. This means that we must construct improvements and do considerable work which benefits the public, but yields only a negligible return to the Government. For instance, we are spending a considerable amount of money each year in the construction and maintenance of public campground improvements for use of the public. We are now being practically forced by the traveling public to construct drift fences to keep stock off the main roads. These fences, in many cases, will necessitate the construction of additional improvements on the ranges, such as water developments, etc., and may also increase administrative costs.

If we are going to consider all of our activities from a cost basis, are we justified in constructing and maintaining our summer headquarters stations on Ranger Districts. A very liberal estimate of the period of use of these stations on this Forest would be 200 days.

Of this period apparently 150 days are spent away from the station on expense. This means that the Ranger actually uses the station about 50 days during each year. A conservative estimate of the cost of a complete set of headquarters improvements is \$5000. The annual depreciation on this investment would be at least \$200. The annual maintenance cost would approach \$100. This means an annual cost of \$300 to be distributed over the fifty days of actual use, of \$6 per day. There are no quarters deductions made for this use. On the surface, it would appear that the Government is furnishing the Ranger accommodations at \$6 per day in lieu of \$2 per diem. We attempt to justify this headquarters expense by stating that the Ranger must have a central office to accommodate users of the Forest and the general public, and to cause him to be more accessible in case fires are reported. As a matter of fact, is not the Ranger away from his station when

75 per cent of the callers and fire calls come to his station? May we not be using an excuse, rather than a cost analysis, to substantiate this established policy? These remarks are based on conditions on the Roosevelt where there are plenty of roads and places where board and lodging can be secured. Personally, I strongly favor our present policy of district headquarters. This discussion is submitted simply to indicate what we may discover by cost analysis.

FRANK GRUBB

PRESCOTT

PRESCOTT, ARIZONA

I am not entirely in accord with Supervisor Hutton on costkeeping needs. Where for example, a project involves what may be termed "cash outlay", as temporary wages, powder and caps, etc., on a trail, it is desirable to know the per mile cost, but here a comparison with some other trail project may not tell us anything, as the amount of rock encountered, timber or brush to be cut, degree of slope, may vary sufficiently between two projects to justify a wide difference in cost per mile.

Each Forest has a yearlong force of so many men, and the annual payroll is therefore a fixed amount. It is presupposed that the Forests are not overmanned and that all the personnel has a full load of work assigned them. Is it of particular value to know that it costs 1c a head per sheep to take grazing applications on one district and 2c on another when the latter may have very valid reasons for the higher cost? As long as the personnel are busy on one activity or another all the time, and desired results in the way of improved ranges, properly handled sales, properly used special uses, and a proper public attitude is secured, I question the value received for taking a clerk's time in going very deeply into expansion accounts involving only the time of yearlong employees. After it has been ascertained that Ranger "A" spends 3c a head for sheep supervision and Ranger "B" 6c, a further analysis would probably show that Ranger B is justified in his higher cost. On the other hand costs may be equal, but one Ranger is getting results in range management and the other is not. This is not so much a case of costkeeping as for Personnel. If a yearlong Ranger reduces costs for any given activity, he must necessarily increase them for something else. To me the condition of a ranger district is the meat in the cocoanut and it is of minor importance if its incumbent, through particular aptitude for some line of work, or because conditions in his district are favorable, can get proper results for less money per unit than his neighbor, or vice versa has to spend more time than his neighbor. It still costs \$2,200 or \$2,600 to administer that district and after all its the results that we get for that money that count.

This is not a tirade against costkeeping, which is considered an essential to any organization, but rather a plea that it is not allowed to get so top heavy that the clerical force on a Forest has to work overtime to keep up with it. They are all pretty well occupied as it is. We can never get down to the same basis as a factory turning out its product at so much per unit, and as long as we have every variety of character in our permittees and the public and the variety of climatical, topographical, geological, botanical and other physical factors that exist to contend with, so long will unit costs justifiably vary between ranger districts, forests and regions.